Personal Ice Cooling System Deployment

Accelerated Site Technology Deployment
Integrated Decontamination and Decommissioning Project

Need

Many Decontamination and Decommissioning (D&D) activities are performed in hot weather and usually require the use of various types and layers of Personal Protective Equipment (PPE). PPE protects workers against contamination but can significantly compromise the body's ability to cool itself, often leading to heat situations. When working in hot conditions, employees require cool-down breaks for 30 minutes or half of their stay time, whichever is longer. This is highly inefficient and can account for a 3-hour loss in an 8-hour workday. A method of keeping workers' core body temperature at safe levels is needed.

Technology Description

The Personal Ice Cooling System is a new technology manufactured by Delta Temax, Inc. that consists of a full body suit similar to long underwear and has tubing sewn into the garment. A full suit includes pants, a shirt or vest, and a hood. The suit comes equipped with a tough, insulated pouch attached to a harness that can be worn on the back, chest, or waist. Ice bottles made of high-density polyethylene can be filled with ice cubes or frozen solid in a standard freezer. The ice bottles are carried in the insulated pouch that can be worn underneath or on top of PPE. A small battery-powered pump circulates chilled water from the ice bottle through the tubing in the suit. The cold water absorbs body heat, and then returns to the ice bottle to be re-chilled. The user can adjust the cooling rate based on the work load and temperature conditions using a two-speed flow control. With the pump and 2 liters of water, the suit weighs only 12 pounds. The PICS is portable, easy to use, and totally self contained.

Benefits

The Personal Ice Cooling System controls heat stress, increases productivity, and improves worker comfort. Feedback from employees was very positive.

- Increases stay times (more than 4 times with temperatures above 100° F), reducing cost and accelerating schedules
- Increases worker well-being, comfort, and productivity
- Ensures safer body temperature
- Significant cost savings as a result of longer stay times, fewer work stoppages, and a decreased for PPE usage

Status

The Personal Ice Cooling Systems purchased under the Accelerated Site Technology Deployment Integrated Decontamination and Decommissioning Project were deployed at the Idaho National Engineering and Environmental Laboratory's Process Experimental Pilot Plant in late June of 1999. In hot conditions, workers wore full PPE and performed heavy work that included removing hazardous heavy metals such as lead, arsenic, and mercury. The vests were deployed and all workers were very positive about using them. They commented that the suits made a big difference and rendered immediate cooling in otherwise uncomfortable conditions. These suits allowed workers to remain in the area for twice as long as they normally would have. Fewer cool down breaks meant that there were fewer changes into and out of PPE. Having longer stay times and using less PPE has already resulted in a cost savings of about 75,304 dollars. It is anticipated that using the suits will continue to increase productivity, worker comfort, and stay times, thus saving even more.

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